

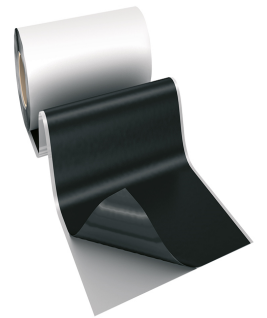
ENVIRONMENTAL PRODUCT DECLARATION

as per /ISO 14025/ and /EN 15804/

Owner of the Declaration	Monier Roofing Components GmbH
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-MRC-20170174-IBB1-EN
Issue date	14.03.2018
Valid to	13.03.2023

WrapTec
Monier Roofing Components GmbH

www.ibu-epd.com / <https://epd-online.com>



1. General Information

<p>Monier Roofing Components GmbH</p> <hr/> <p>Programme holder IBU - Institut Bauen und Umwelt e.V. Panoramastr. 1 10178 Berlin Germany</p> <hr/> <p>Declaration number EPD-MRC-20170174-IBB1-EN</p> <hr/> <p>This Declaration is based on the Product Category Rules: Plastic and elastomer roofing and sealing sheet systems, 07.2014 (PCR tested and approved by the SVR)</p> <hr/> <p>Issue date 14.03.2018</p> <hr/> <p>Valid to 13.03.2023</p> <hr/> <p></p> <hr/> <p>Prof. Dr.-Ing. Horst J. Bossenmayer (President of Institut Bauen und Umwelt e.V.)</p> <hr/> <p></p> <hr/> <p>Dr. Burkhard Lehmann (Managing Director IBU)</p>	<p>WrapTec</p> <hr/> <p>Owner of the Declaration Monier Roofing Components GmbH Frankfurter Landstraße 2-4 D-61440 Oberursel</p> <hr/> <p>Declared product / Declared unit 1 m² WrapTec - universal cladding and jacketing solution for technical insulations.</p> <hr/> <p>Scope: This document applies to WrapTec - universal cladding and jacketing material manufactured by MONIER Roofing Components GmbH in Berlin, Germany. The declared unit is 1 m². The data collection is based on the annual production data from 2016 collected by MONIER. The declarant is responsible for the underlying data and their verification. The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.</p> <hr/> <p>Verification</p> <p>The CEN Norm /EN 15804/ serves as the core PCR</p> <p>Independent verification of the declaration according to /ISO 14025/</p> <p><input type="checkbox"/> internally <input checked="" type="checkbox"/> externally</p> <hr/> <p></p> <hr/> <p>Patricia Wolf (Independent verifier appointed by SVR)</p>
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2. Product

2.1 Product description / Product definition

WrapTec is an universal cladding product for technically insulated pipe systems. It is composed of two-layer laminate consisting of Polyisobutylene (PIB), including color pigments and stabilizers against UV exposure and aging.

For the use and application of the product the respective national provisions at the place of use apply, in Germany for example the Building Codes of the countries and the corresponding national specifications.

2.2 Application

WrapTec is applicable as a UV- and weather-resistant, self-sealing covering material in the area of technical insulation, such as pre-insulated pipes of Domestic Services, heating, ventilation and air conditioning (HVAC) ducts and process engineering installations.

2.3 Technical Data

Constructional data

Name	Value	Unit
Waterproof nach EN 1928 (Dachbahnen)	not applicable	-
Tensile strain performance nach EN 12311-2 (Dachbahnen)	not applicable	%
Peel resistance of the seam joint (Dachbahnen)	not applicable	N/50mm
Shear resistance of the seam joint (Dachbahnen)	not applicable	N/50mm
Seam strength nach EN 12317-2 (Dachbahnen)	not applicable	-
Tear propagation resistance nach EN 12310-2 (Dachbahnen)	not applicable	N
Artificial ageing nach EN 1297 (Dachbahnen)	not applicable	-
Dimensional stability nach EN 1107-2 (Dachbahnen)	not applicable	%
Folding in the cold nach EN 495-5 (Dachbahnen)	not applicable	°C
Bitumen compatibility nach EN 1548 (Dachbahnen)	not applicable	-
Resistance to root penetration (for green roofs) nach EN 13948 bzw.	not applicable	-

FLL (Dachbahnen)		
Ozone resistance (for EPDM/IIR) nach EN 1844 (Dachbahnen)	not applicable	-
Waterproof nach EN 1928 (Dichtungsbahnen)	not applicable	-
Tensile strain performance nach EN 12311-2 (Dichtungsbahnen)	not applicable	%
Resistance to impact loads nach EN 12691 (Dichtungsbahnen)	not applicable	mm
Shear resistance of the seam joint nach EN 12317-2 (Dichtungsbahnen)	not applicable	N/50mm
Tear propagation resistance nach EN 12310-2 (Dichtungsbahnen)	not applicable	N
Application temperature	+5 to +40	°C
Heat resistance	-40 to +100	°C
Stability (UV) /DIN EN 16726/ (/DIN EN ISO 20811/)	given	-
Water column (in the expanse and in sealed T-joints 3-fold overlapping points) /DIN EN ISO 20811/	> 7.5	m
Vapour permeability /DIN EN ISO 1931/	Sd > 400	m
Storage	dry up to +40	°C

Performance data of the product with respect to its characteristics in accordance with the relevant technical provision (No CE-marking).

2.4 Delivery status

WrapTec is available in two colours as packaged rolls with the following sizes:

- 70 mm (Width) x 10 m (Length)
- 140 mm (Width) x 10 m Length
- 280 mm (Width) x 10 m (Length)
- 560 mm (Width) x 10 m (Length)

2.5 Base materials / Ancillary materials

WrapTec is a two-layer laminate consisting of the following components:

- Polyisobutylene (PIB): 20 - 25 M.-%
- Calcium carbonate: 35 - 40 M.-%
- Aluminium silicate: 10 - 15 M.-%
- Polyethylene (PE): < 5 M.-%
- sealing adhesive: < 5 M.-%
- pigments: < 2 M.-%
- stabilizers: < 5 M.-%
- additives: < 5 M.-%

2.6 Manufacture

WrapTec is produced in 3 process steps:

Semi-finished production

All ingredients are blended in a kneader. Excesses from previous productions and edge off-cuts are added to the production components. Subsequently, the kneading compound is shaped into a film form by means of an extruder. The film is coated with color pigments and UV stabilizers.

Lamination application

The WrapTec film, which is now functional, is applied with sealing adhesives - over the entire surface for later welding of overlapping films - and a release film (removable protective film for transport).

Edge trimming and packaging

After the edge trimming, the WrapTec film passes a measuring station in order to be tailored to the desired finishing. The films are then rolled up over a winding system.

2.7 Environment and health during manufacturing

All raw materials used are brought into the production plant without any environmental impact. Contamination of the environment by exhaust air, sewage or waste does not occur if the plant is operated properly.

Throughout the manufacturing process additional measures for health safety - exceeding the legal measures for occupations safety for business enterprises - are not required.

During the production of WrapTec, the staff is not exposed to any health risks at no time. Residues resulting from production delivery transition are returned to the ongoing operation of the plant.

2.8 Product processing/Installation

WrapTec is applicable on dry and dust-/oil-/fat-/silicone- and ice-free surfaces. A proper support of WrapTec must be ensured at any place. The material can be stretched by 50 % in all directions and is thereby easy and fast to install. No tools apart from scissors are required.

An overlap of 20 mm is sufficient in order to provide protection to the insulation and duct system itself. The joints have to be pressed together properly, in order to assure the tightness of the system. It should be noted that running water does not run against product edges.

Water sags and bags and standing water have to be avoided. Additional installed components must not apply tension on WrapTec after the installation. Ensure, that the insulated object does not emit any gas.

WrapTec is not compatible with the following substances: Bitumen, tar, turpentine, petrol, fat, nitro-paint thinner, oil, hydrochloric-acid, tetrahydrofuran.

2.9 Packaging

WrapTec is wrapped in 2 or 4 rolls cartons and is batched on wooden pallets. The wooden pallets can be used by the recipient.

The packaging materials can be sorted and collected for recycling, using the system "Der Grüne Punkt – Duales System Deutschland GmbH (DSD)" (Green Dot – German Dual System). The wooden pallets can be reused by the recipient. All packaging materials are recyclable.

2.10 Condition of use

The material composition does not change during service life.

2.11 Environment and health during use

During its service life, WrapTec has no negative influence or harmful effects on air quality, the environment and the health of users. No release of emissions from the product into air or water is known. WrapTec is physiologically harmless to humans.

2.12 Reference service life

Based on the useful lives of building components according to the Sustainable Building Assessment System /BBSR-Table 2017/, the reference service life of plastic film exceed 30 years.

2.13 Extraordinary effects

Fire

According to the procedures of /EN 13501-1/ WrapTec is ranked into the class E related to its behaviour in case of fire.

Fire protection

Name	Value
Building material class DIN EN ISO 11925-2, DIN EN ISO 13501-1, DIN 4102	E (B2)
Burning droplets	-
Smoke gas development	yes

Water

The material of WrapTec is waterproof. Neither does the material dissolve in water nor toxic substances are exposed to the environment and water. WrapTec has no known harmful effect on groundwater.

Mechanical destruction

There are no relevant environmental impacts associated with mechanical destruction.

2.14 Re-use phase

WrapTec is not intended to be reused in its original form at the end of its useful life. It can be thermally utilized.

2.15 Disposal

Disposal must be executed according to local regulations governing. WrapTec can be disposed as Plastic (disposal code /EWL 17 02 03/).

WrapTec does not require special handling or waste disposal procedures. The material is not readily biodegradable and does not contain a significant percentage of water extractable materials. Therefore the material should be given preference to landfill disposal or incineration in a suitable installation.

2.16 Further information

On the MONIER-website processing instructions, product data sheets, safety information and other technical information are available for download in the latest edition. These must be noted:

www.braas-monier.com

www.wraptec.net

3. LCA: Calculation rules

3.1 Declared Unit

This declaration applies to 1 m² of WrapTec cladding material. WrapTec is self-adhesive and self-welding, therefore no additional loads are required.

Declared unit

Name	Value	Unit
Declared unit	1	m ²
Thickness	1.05	mm
Grammage	1.85	kg/m ²
Conversion factor to 1 kg	0.54	-

3.2 System boundary

The Life Cycle Assessment considers the system boundaries "cradle to gate - with options" and follows the modular construction system described by /EN 15804/. The LCA takes into account the following modules:

- A1-A3: Manufacturing of pre-products, packaging, ancillary materials, transport to the factory, production including energy supply and waste handling
- C2: Transport to waste-processing facility
- C3: Waste processing for reuse, recovery and/or recycling
- D: Potential for reuse, recovery and/or recycling as net flows and benefit

3.3 Estimates and assumptions

Specific data regarding the production process was provided by MONIER. Missing data was supplemented by estimates based on comparable substitutes or data used from the secondary literature and the database /GaBi 8:2017/. Missing data was modelled by the Life Cycle Analyst, including the UV and thermo stabilizer with a mass percentage rate of <2 %. For the adhesive an estimate on polyisobutylene (PIB) was made. For the used pigments a customary cross-industry composition was modelled.

3.4 Cut-off criteria

All relevant data, i.e. all applied materials according to the recipe and the energy used originate from the production data acquisition and have been considered within the inventory analysis. For the considered in- and outputs the actual transport distances were used. Material- and energyflows with a proportion of less than 1 % were collected. Waste of upstream products, which accumulate in small quantities (<1 %) during the manufacturing process, was neglected.

It can be assumed, that the sum of the neglected processes does not exceed 5 % of the impact categories.

3.5 Background data

Primary data has been provided by MONIER. All background data required for the Life Cycle Assessment originates from the database of the GaBi-Software /GaBi 8:2017/. For the UV and thermal



stabilizers, estimates were made with the help of secondary literature.

3.6 Data quality

For modelling the Life Cycle of WrapTec production, data has been collected by MONIER in the manufacturing plant from the production year 2016. All other relevant background data has been taken from the database of the /GaBi 8:2017/ software. For the Life Cycle Inventory Analysis all input and output flows have been respected. The representativeness and data quality is therefore rated as good.

3.7 Period under review

The amount of raw materials, input energy and the volume of waste relate to the year 2016. Additional data was taken from the database of /GaBi 8:2017/. It corresponds to the best currently available technology and thus is representative for the considered time period. The reference area is Germany.

3.8 Allocation

On the same production line another film with partly different production inputs, is generated. The predominant amount of production material does not differ from WrapTec and can therefore be assigned to the products through allocation. Energy consumption is recorded by MONIER product-specifically.

3.9 Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to /EN 15804/ and the building context, respectively the product-specific characteristics of performance, are taken into account.

4. LCA: Scenarios and additional technical information

The following technical information models the basis for the declared modules or can be used for developing specific scenarios within the context of a building appraisal if modules are not declared (MND).

The reference service life according to /ISO 15686-1/ could not have been determined. The declaration of the reference service life underlies the assessment system of the Federal Institute for Research on Building, Urban Affairs and Spatial Development.

Within the modeling of the End-of-Life, a collection rate of 100% was assumed for later thermal utilization in a waste incineration plant with an R1 factor of > 0.6.

Reference service life

Name	Value	Unit
Life Span (according to BBSR)	30	a

End of life (C1-C4)

Name	Value	Unit
Energy recovery	1.85	kg

5. LCA: Results

The table displayed below summarizes the results of the Life Cycle Assessment (LCA). The results refer to the declared unit of 1 m² WrapTec material. The LCA and Life Cycle Impact Assessment are based on the specifications of the European Standard using the CML method 2001 – April 2015.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	MND	MND	MND	MND	MNR	MNR	MNR	MND	MND	MND	X	X	MND	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 m² WrapTec

Parameter	Unit	A1	A2	A3	C2	C3	D
Global warming potential	[kg CO ₂ -Eq.]	2.57E+0	1.10E-1	2.88E-1	1.13E-2	2.35E+0	-7.62E-1
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	3.40E-4	1.40E-14	1.09E-12	1.42E-15	1.33E-13	-1.42E-12
Acidification potential of land and water	[kg SO ₂ -Eq.]	6.32E-3	4.68E-4	4.29E-4	4.43E-5	9.15E-4	-8.13E-4
Eutrophication potential	[kg (PO ₄) ³ -Eq.]	8.60E-4	1.16E-4	6.86E-5	1.09E-5	1.73E-4	-1.28E-4
Formation potential of tropospheric ozone photochemical oxidants	[kg ethene-Eq.]	1.39E-3	-1.74E-4	2.97E-5	-1.61E-5	5.61E-5	-8.50E-5
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	4.87E-6	1.15E-8	1.45E-7	1.17E-9	2.04E-7	-2.08E-7
Abiotic depletion potential for fossil resources	[MJ]	6.28E+1	1.50E+0	2.81E+0	1.52E-1	1.00E+0	-9.87E+0

RESULTS OF THE LCA - RESOURCE USE: 1 m² WrapTec

Parameter	Unit	A1	A2	A3	C2	C3	D
Renewable primary energy as energy carrier	[MJ]	4.94E+0	9.90E-2	1.58E+0	1.01E-2	1.99E+0	-2.06E+0
Renewable primary energy resources as material utilization	[MJ]	1.78E+0	0.00E+0	0.00E+0	0.00E+0	-1.78E+0	0.00E+0
Total use of renewable primary energy resources	[MJ]	6.72E+0	9.90E-2	1.58E+0	1.01E-2	2.08E-1	-2.06E+0
Non-renewable primary energy as energy carrier	[MJ]	3.45E+1	1.50E+0	3.66E+0	1.53E-1	3.14E+1	-1.10E+1
Non-renewable primary energy as material utilization	[MJ]	3.03E+1	0.00E+0	0.00E+0	0.00E+0	-3.03E+1	0.00E+0
Total use of non-renewable primary energy resources	[MJ]	6.47E+1	1.50E+0	3.66E+0	1.53E-1	1.11E+0	-1.10E+1
Use of secondary material	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of non-renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of net fresh water	[m ³]	1.19E-2	1.15E-4	1.07E-3	1.18E-5	0.00E+0	-1.40E-3

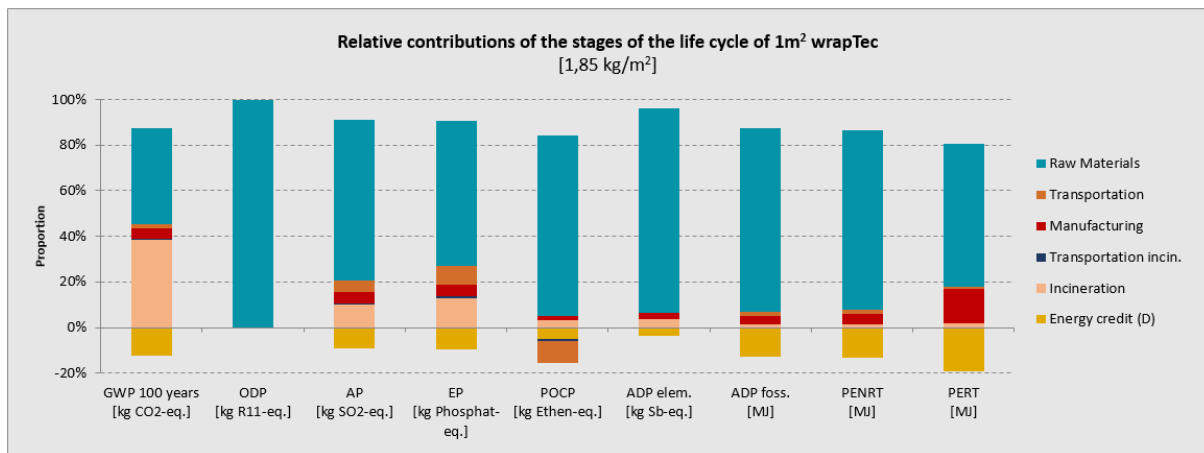
RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES:

1 m² WrapTec

Parameter	Unit	A1	A2	A3	C2	C3	D
Hazardous waste disposed	[kg]	1.96E-3	9.46E-8	2.40E-9	9.64E-9	5.40E-9	-3.94E-9
Non-hazardous waste disposed	[kg]	4.42E+0	8.27E-3	1.70E+0	8.43E-4	3.79E-1	-2.23E+0
Radioactive waste disposed	[kg]	8.01E-4	1.72E-6	3.36E-4	1.76E-7	4.37E-5	-4.40E-4
Components for re-use	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Materials for recycling	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Materials for energy recovery	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Exported electrical energy	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.20E+0	0.00E+0
Exported thermal energy	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	5.81E+0	0.00E+0

6. LCA: Interpretation

The following figure shows the relative contributions of different Life Cycle processes and the primary energy demand in the form of a dominance analysis.



Indicators of the impact assessment

The impact categories of the WrapTec production are significantly determined by the manufacturing process (A1: raw material supply) and the thermal utilization at the end of the product life.

Global warming potential (GWP)

The Greenhouse Gas Potential is determined by the supply of raw materials, i. e. by the production of the preliminary products and the thermal utilization. In the production phase (A1-A3) the raw material supply contributes with 85 % to the GWP-value. At the thermal utilization in the end of the product life high levels of greenhouse gas emissions are released, compared to other phases of the product life.

Depletion potential of the stratospheric ozone layer (ODP)

The ozone depletion factor is almost completely determined by the supply of raw materials. The main driver is the production of polymer polyisobutylene (PIB), which determines the ODP-value by more than 99 %.

Acidification potential of land and water (AP)

The AP factor is dominated by the supply of raw materials with 82 %, within which the greatest contribution of 45 % is due to the provision of PIB, followed by stabilizers and colorants with a share of 23 %. Stabilizers and colorants reduce oxidative processes and thus increase the aging and weathering resistance of the product.

Eutrophication potential (EP)

The EP factor is determined at 74 % by the supply of raw materials. Additives such as colorants and pigments have a disproportionately large influence, and with a mass fraction of about 5 %, cause a potential for eutrophication of 41 % within the production process. Main driver within this is titanium dioxide (88 %), which is used in the product as a colorant and stabilizer.

Potential of tropospheric ozone photochemical oxidants (POCP)

The POCP-value is determined by the current input of electricity and the raw material supply. The transport of the material need for production purpose has a marginal share of the POCP-value.

The negative value in the transports is caused by the chosen CML impact assessment, whereby NO_x emissions are split into two separate NO₂ and NO emissions. The NO has a negative effect on the POCP as it reduces the tight soil ozone formation.

Abiotic depletion potential for non-fossil resources (ADPE)

The ADPE-value of 84 % is mainly due to the use of inorganic colorants and other metal oxides in the production.

Abiotic depletion potential for fossil resources (ADPF)

The ADPF factor is determined by the use of polymeric precursors PIB (64 %) and organic additives (11 %), which are used to improve the material properties in the product.

Total use of non-renewable primary energy resources (PENRT)

For the use of primary energy from non-renewable resources, the bulk of energy needs arises from the production of raw materials (A1). The proportion is due to the use of fossil organic raw materials for plastic production. The primary energy bound in the products can be partly thermally recycled at the end of life of the product.

Total use of renewable primary energy resources (PERT)

Compared to the input of non-renewable resources, the share share of renewable resources is low (ca. 12 %). Overall, the highest rate of renewable primary energy resources is in the production of precursors and upstream supply chain. For the generated electric and thermal energy during thermal utilization, energy credits can be granted.

7. Requisite evidence

No further evidence is required.

8. References

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